BASIC SCIENCE SERIES

7

LIVING THINGS – ANIMALS

REVISED EDITION

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LIVING THINGS — ANIMALS

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INTRODUCTION

In our world of living things we have plants, animals and people. Plants belong to a group called the **Plant Kingdom** while animals and people belong to the **Animal Kingdom**.

Look around you and you will see many different types of animals. Some animals are tiny while others are very large. Some animals are soft and long, while others are hard and rounded. Different types of animals which are alike in certain ways are put into groups. Let us find out how animals are put into groups.

Some members of the Animal Kingdom

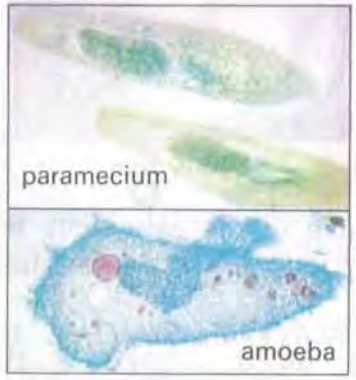
HOW ANIMALS ARE PUT INTO GROUPS

We can put animals into groups by studying their behaviour. We want to know how their bodies work, how they live, how they produce their young, how they find their food, what they eat, how long they live, and so on. We also have to examine the different parts of their bodies. When we examine them, here are a few questions we must ask ourselves: Do they have scales, feathers or fur on their bodies? How many parts are their bodies divided into? How many legs do they have? How many wings are there? Are there fins?

But the first and most important question is: Do the animals have backbones or not? All animals with backbones are put into one big group called **vertebrates**. All animals without backbones go into another group called **invertebrates**.

Sponges are invertebrates.

A bird is a vertebrate.



These tiny, delicate creatures are protozoans.

INVERTEBRATES

Invertebrates are animals which do not have backbones or other bones inside their bodies. Some have soft bodies and some have hard coverings which protect their bodies. There are many kinds of invertebrates.

PROTOZOANS

Protozoans are one kind of invertebrate. They are tiny and can only be seen through a microscope. Each protozoan consists of one cell only.

COELENTERATES

Coelenterates are soft, jelly-like invertebrates with long finger-like **tentacles** which can sting you. They have hollow bodies. Most of them

A coelenterate

A jelly fish

A group of sea anemones

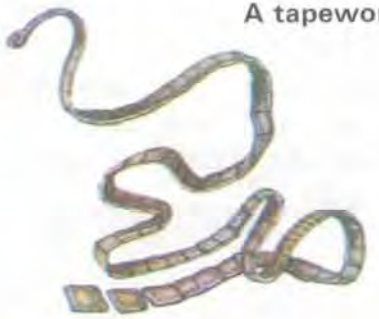
live in the sea. Jelly fishes, sea anemones and corals are coelenterates.

PLATYHELMINTHES OR FLATWORMS

Platyhelminthes are animals with thin, flat bodies. Free-living flatworms are found in fresh or salt water or in moist places on land e.g. under stones on the seashore. The **flukes** and **tapeworms** are parasitic flatworms. They are parasites of Man, livestock and wild animals, causing illness and even death to these hosts.

A fluke

A tapeworm



NEMATODES OR ROUNDWORMS

Nematodes are shiny S-shaped worms with slender cylindrical bodies. Some are free-living

A nematode worm (hookworm)

and are found in soil and water. Others like the hookworm and threadworm are parasites of Man and other animals.

ANNELIDS OR RINGED WORMS

Annelids are soft, moist worms which have rings around their bodies. They breathe through their skins. Earthworms, leeches and sandworms are annelids. Sandworms live in the sea and sometimes burrow in the beach. Leeches live on the blood of other animals such as pigs, horses and even human beings. Earthworms burrow in the soil while a few live in fresh water.

As earthworms burrow, they swallow the soil together with the food in the soil. The food is made use of by the body but the soil is passed out in little heaps called **worm-casts**. Earthworms are very useful to farmers because

A leech

A sandworm

An earthworm

they bore holes in the soil. This allows air and water to enter the soil, and helps plant roots to grow more easily. They drag leaves into the soil. These rot and make the soil better for growing plants.

ARTHROPODS

Arthropods make up a very large group of invertebrates. They are found almost everywhere. All of them have jointed legs and hard outer coverings. They can be divided into four smaller groups. These are the **myriapods**, the **arachnids**, the **crustaceans** and the **insects**.

Myriapods

Centipedes and millipedes are myriapods. Both have long bodies divided into many segments and many pairs of legs. Centipedes have poisonous stings but millipedes are harmless.

A millipede

A centipede

A spider

A scorpion

Arachnids

Spiders, scorpions, king crabs, ticks and mites are arachnids. An arachnid has eight legs and a body made up of two parts. Spiders spin webs which they use to trap their food. Scorpions have poisonous stings. Ticks and mites live on the skins of human beings and other animals. Mites cause scabies.

Crustaceans

Crayfish, crabs, lobsters, prawns, shrimps and barnacles are crustaceans. Most crustaceans live in the sea but some crabs and prawns live in fresh water as well. Crustaceans are very important to human beings because they can be eaten as food.

Some examples of crustaceans

Insects

All insects have six legs each and a body made up of three parts — **head**, **thorax**, and the **abdomen**.

Our world has large numbers of insects and there are many types of insects too. Grasshoppers, butterflies, moths, flies, mosquitoes, bees and ants are some very common types of insects. Some insects such as mosquitoes are very harmful because they can spread diseases. Other insects such as cockroaches destroy things like clothing, wood and books. Grasshoppers are a nuisance because they feed on plants which Man grows for his own food.

But many insects are useful to us. We get honey from bees. The silkworm gives us silk. Bees, butterflies and moths pollinate flowers. As a result, these flowers develop into fruits and seeds. Some insects help us by killing other harmful insects which damage plants.

These are some common insects.

How many of these insects have you seen before?

Things to Do

(i) Let us find out about the parts of different insects. Go out to the garden or field and collect as many insects as you can find. Can you name your insects?

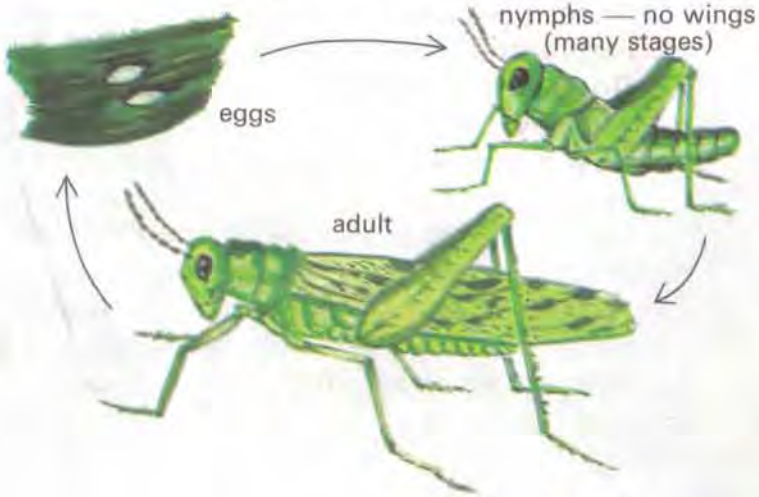
Put three different kinds of insects on a piece of paper. Now look at your insects closely with a hand lens. Answer these questions: How many legs, wings, feelers and eyes does each insect have? Do all your insects have the same number of body parts? Which parts are these? How many stomach parts are there in each insect? What is the colour of each insect? Which is the biggest insect? Which is the most beautiful?

Now look at the wings of your insects. What do you see? Rub the wings. Do little scales come off?

(ii) Let's study a live grasshopper. You can find a grasshopper among grass or the leaves of certain plants. Now answer these questions: What does the grasshopper feed on? What is the colour of its body? How many body parts are there? Has it wings? How many? How many legs has it? From which part of the body do they grow? Are the eyes large or small? What is the shape of each eye? Where are the eyes placed? Are there eyelids? What else can you find on the head?

Take a metric tape measure and measure the length of the grasshopper, the length of its back legs, the length from one wingtip to the other and the length of the longest of three jumps.

Life cycle of a grasshopper



All insects grow from eggs. Some insects such as butterflies, lay their eggs on leaves. Others like grasshoppers lay their eggs in the soil. The eggs of water insects float in water.

The young insect which hatches from the egg passes through many forms before it becomes a fully grown adult called an **imago**. In insects such as the grasshopper and ant, the young insect which hatches from the egg looks just like the imago. But it is smaller and its colour may be different. It is called the **nymph**.

A maggot

A grub

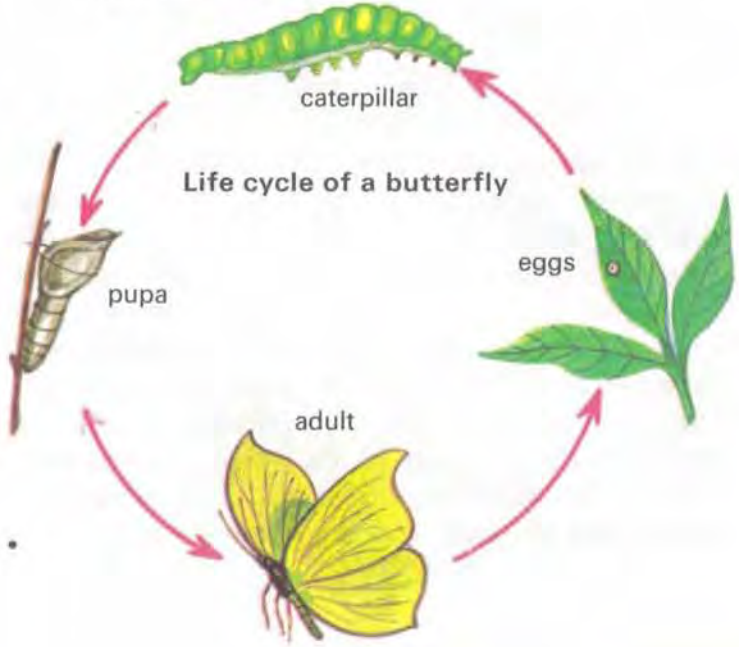
A caterpillar

In other insects such as butterflies, moths, houseflies, mosquitoes and beetles, the young look very different from the imagoes. The eggs hatch to give **larvae**. Larvae of different insects do not look alike and are given different names. The larva of a butterfly or moth is a **caterpillar**. The housefly larva is a **maggot**. The larva of a beetle is a **grub**. Larvae in turn grow into other forms known as **pupae**, and these become imagoes. The pupae of some insects have special names also.

Things to Do

Let's find out what caterpillars grow into. Collect a few caterpillars from your garden. Also collect a few leaves from the plants on which you found the caterpillars. Put the caterpillars and leaves into a cardboard box containing some soil. Cover the box with a wire screen or mosquito netting. Sprinkle water into the box.

Look at the caterpillars. What colour are they? How many legs does each one have? How do they move? Watch the caterpillars everyday. After how long do they change to a pupa? What does a pupa look like? When does a pupa become an adult?



All these animals are molluscs.

MOLLUSCS

Squids, cuttlefish, octopuses, shell-fish and snails are molluscs. Molluscs are a group of soft, slimy animals. Most of them live in the sea but some live in rivers and others live in gardens. Many molluscs have shells which protect their soft bodies. Shell-fish such as oysters, mussels and clams have two shells each. Snails are molluscs with one shell each.

ECHINODERMS

Echinoderms are also known as "spiny-skinned animals" because most of them have needle-shaped spines. Sea-stars, sea-urchins and sea cucumbers (sea slugs) are echinoderms.

These echinoderms live on the sea floor.

VERTEBRATES

Vertebrates are animals with backbones and bones inside their bodies. The bones help to support their bodies. There are five main groups of vertebrates — the **fishes**, the **amphibians**, the **reptiles**, the **birds** and the **mammals**. Fishes, amphibians and reptiles are known as **cold-blooded** vertebrates. The temperature of their blood is the same as the temperature of their surroundings. Birds and mammals are known as **warm-blooded** vertebrates. The blood of a warm-blooded vertebrate remains around the same temperature both on warm and cold days.

The five main groups of vertebrates

birds

fishes

mammals

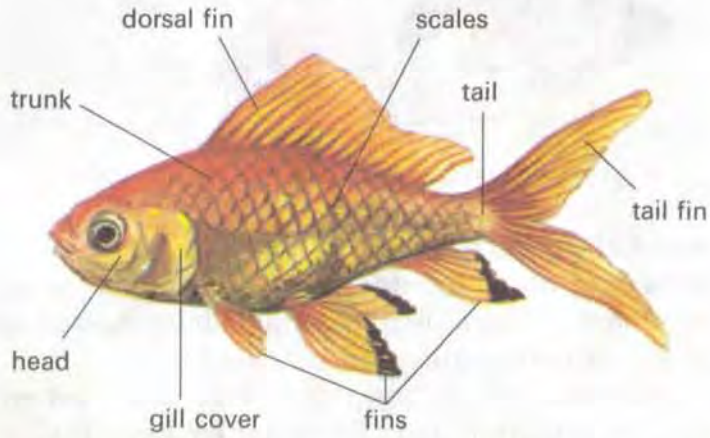
amphibians

reptiles

FISHES

Fishes live in water and have **fins** which help them to swim. Most fishes have slimy skins covered with **scales**, but in fishes such as eels the scales are very small and can hardly be seen.

Parts of a fish



Fishes breathe through **gills**. These are comb-like in appearance and lie on each side of the head. Fishes take in water all the time. The water flows in through the mouth, over the gills and out through the sides of the head. When a fish takes in water, it is not drinking but breathing. The gills absorb oxygen from the water.

The body of a fish is made up of the **head**, the **trunk** and the **tail**. The tail ends in a **tail fin**.

There are many different kinds of fishes and they are of many different shapes and colours.

A group of attractive and colourful fishes

Some like coral trout, parrot fish and red emperor, have brightly-coloured bands, stripes or spots on them. Others like the catfish and leather jacket are dull and mud-coloured.

Some fishes are long and thin while others are flat and rounded. Most fishes have bodies which are broad at the trunk region and narrow towards the head and tail.

Can you describe the shapes of all the different kinds of fishes you eat?

AMPHIBIANS

Frogs, toads, newts and salamanders are amphibians. All amphibians have thin skins which are usually wet and slimy. They have two pairs of legs. The toes of most amphibians have webs of skin between them. This allows them to swim well in water.

Young amphibians live mainly in water and breathe through gills. They can also breathe through their skins. Young frogs and toads look like little fishes and are called **tadpoles**. As young amphibians grow older, the gills disappear and lungs are formed. Fully grown amphibians may live on land and breathe through their lungs. They can also breathe through their skins when they return to the water.

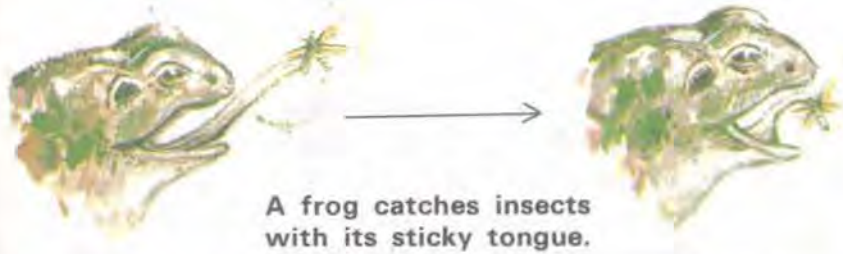
The body of a frog or toad is made up of two parts — the **head** and the **trunk**. There is no neck or tail. Adult newts and salamanders have tails.

Frogs and toads are important to human beings as they feed on insects. Some of these insects may be harmful to us. Toads produce poison from the skin for protection. Wash your hands after touching a toad!

Things to Do

(i) Let's study a live frog or toad. Examine the animal carefully and answer these questions: What is the colour of its skin?

This is how a frog moves.



A frog catches insects with its sticky tongue.

Is the skin smooth or rough? What is the colour of its eyes? Has it eyelids? Has it ears? How many toes does it have on each leg?

Now take a metric tape measure and measure the length from head to toe, the breadth of the trunk at the widest point, the length round the stomach, the length of the back leg, the length of the front leg and the length of the longest of three jumps.

Put the animal back in a box and put some live houseflies or other insects into the box. Watch how it catches the insects. Notice how the eyes move into the head when it swallows its food.

(ii) Let's cut open a frog or toad to see what its body is made up of. Place your frog or toad in a glass jar which has a tight lid. Soak a large piece of cotton wool in chloroform or methylated spirit. Put this into the jar and close the lid tightly. Leave it for ten minutes. What happens?

Now take your frog or toad and place it on its back on a piece of cardboard. Stretch its legs out and pin them down.

Carefully cut through the skin up the middle of the body. Be careful not to cut the flesh (**muscle**) underneath. Peel back the flaps of skin and cut them off. Now carefully cut the flesh, peel it back and cut it off.

Cut up the middle of the **ribs** and fold them back. Can you see the **lungs**? Put a drinking straw into the animal's throat and blow. Watch how the lungs begin to expand.

Now cut away the lungs and look at the **heart**. Is it still beating? Do you see tiny tubes near it? These are **blood vessels**.

Find the tube beginning at the **mouth** and ending at the **anus**. This is the **food canal**. Can you find the **stomach** which is a large bag in the middle of the body? Look for the **intestines**. Cut this tube out and measure how long it is. Cut open the stomach and see what is inside it.

The eggs of a frog hatch into tadpoles.

Use a pair of forceps and pull the **tongue** out. How long is it? Is it sticky? Peel the skin off one leg and look at the leg muscles.

(iii) Let's make a home for tadpoles. Take a big glass tank and half-fill it with water. Put some sand and stones in it. Put a large rock at one end. The rock should jut out above the water surface. Now collect some water plants and plant them in the sand.

Collect some tadpoles from a stream or pond. Put them into the tank. Watch how they move. Keep the tank on a desk away from bright sunlight. Add small live insects and dried fish food to the water.

Watch the tadpoles for a few weeks. Add more food to the tank every day. What happens to the tadpoles? When do the front and back legs grow? What happens to the tail? When do the tadpoles become fully grown frogs?

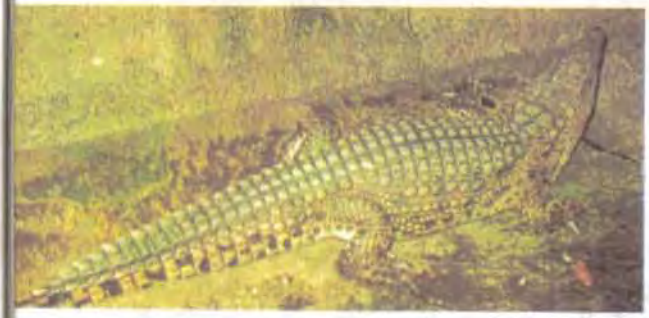
Tadpoles grow legs and become little frogs.

REPTILES

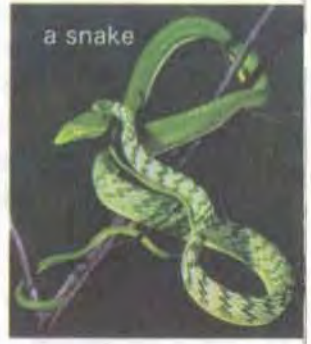
Reptiles live mainly on land but some live in water. They breathe through **lungs** and have dry scaly skins. Reptiles which live in water come to the water surface to breathe. Reptiles lay eggs with hard shells. Lizards, snakes and tortoises are reptiles which live mainly on land while crocodiles, alligators and turtles live in water.

The body of a reptile such as the crocodile and lizard is made up of the **head**, the **trunk** and the **tail**. Most reptiles do not have necks.

Many reptiles have four legs with toes.



Crocodiles and turtles are reptiles.



Lizards and snakes are reptiles too.

Turtles and tortoises have hard shells which protect their bodies.

Snakes are different from the other reptiles because their bodies are very long and they have no legs. They move by gliding along the ground. Some snakes can swim also.

BIRDS

Birds are animals with **feathers** on their bodies. They have many different types of feathers. Some are small and fluffy and others are long and flat. Feathers come in many different colours.

Birds have no front legs but instead they have

Birds have many different shapes and colours.

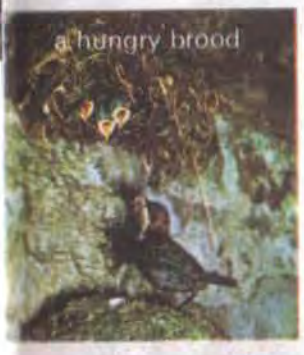
a pair of **wings**. They use their wings to fly. But the wings of some birds, such as penguins and emus, are small and stubby. These birds cannot fly.

The two back legs of a bird bear a few toes which end in **claws**. Some birds which swim, such as ducks and swans, have webs of skin between their toes. There are **scales** on the legs of birds too. The body of a bird is made up of a **head**, a **neck**, a **trunk** and a **tail**.

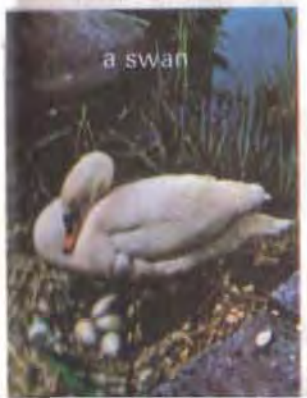
The mouth of a bird is in the form of a hard **bill** (or **beak**). The shape of the bill depends on the type of food the bird eats. Some birds, such as ducks, have flat bills for sieving small

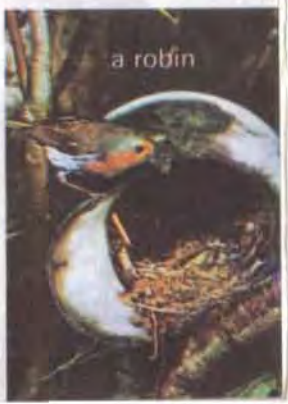
bits of food from the mud. Other birds such as eagles have sharp, pointed bills for catching small animals and tearing fish. Birds which search for frogs and worms in the mud, such as storks and flamingoes, have long pointed bills.

Birds lay eggs which have hard shells. The eggs of different birds are of different shapes, sizes and colours. Most birds lay their eggs in **nests**. The young which hatch from the eggs are called **chicks**. The mother bird takes care of her eggs and chicks for some time. She feeds the chicks and keeps them warm.



Birds build nests and look after their young ones.





MAMMALS

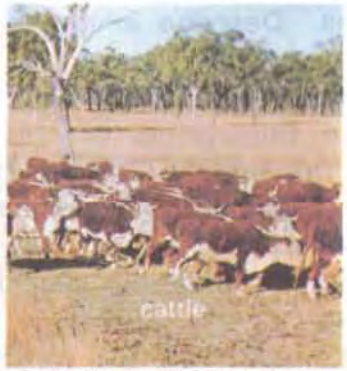
Most mammals live on land but some such as whales and dolphins live in water. Some mammals such as bats have wings and can fly. Other mammals such as moles and rabbits burrow into the ground and live there.

Mammals have **hair** on their bodies. Bears and dogs have very thick hair which is called **fur**. Human beings have little hair on most parts of their bodies but a lot on their heads. Walruses and seals have little hair.

Different types of mammals

Most mammals live in groups.

Courtesy of Australian High Commission, Singapore.



Courtesy of Australian High Commission, Singapore.

All mammals breathe through **lungs**. Even those which live in water have to come to the surface of the water to breathe.

The young of mammals grow in the bodies of their mothers. When they are old enough, they come out of their mothers' bodies. When they come out, they are said to be **born**. The mother takes care of her new-born baby and feeds it with **milk** which is formed in her body. When the baby is older, he takes care of himself.

Things to Do

(i) Take a hand lens and look at the skin on your arms and hands. Draw a small circle on your skin about the size of a small coin and count the number of hairs inside it. Look at the skin on different parts of your body, such as inside your hands, under your feet, under your finger and toe nails and around scars, sores and moles. Describe what you see each time.

Now put some ink on your fingertips and make fingerprints on paper. Look at your fingerprints with a hand lens. Are your fingerprints the same as those of your classmates? You can also make fingerprints by pressing your fingers on plasticine.

(ii) Collect a number of skin coverings from dead snakes, lizards and frogs; shells from snails and shell-fish; scales from fish; hair from dogs and feathers from birds. Look at each one. Is it rough or smooth? Is it hard or soft? Which one is the hardest, the softest, the smoothest and the roughest? Now look at them with a hand lens. Compare them to your own skin.